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sion for the diffusion of entomological knowledge, Missouri not only leads all the States in the Union, but shows that she regards it as an economical measure to induce every farmer to be his own entomologist.

GUIDE TO THE STUDY OF INSECTS.*—The sixth number of this work is out, and contains accounts (not before published) of the transformations of twelve moths injurious to fruits, etc., mostly illustrated, besides notices of the Clothes' Moth, Carpet Moth, Grain Moth, the Angoumois Grain Moth, etc., with full directions for collecting the smaller moths. The chapter on Diptera is begun, and gives accounts of the Mosquito, the Wheat Midge, Hessian Fly and Gall Flies. The number contains a steel plate figuring forty different objects, and fifty-seven cuts in the text. We should here state that the *Penthina vitivorana* feeds exclusively on the grape seed; it rolls up the leaf when about to transform, but does not *feed* upon it. Lines eight and nine from the bottom, on page 336, may therefore be deled.

LE NATURALISTE CANADIEN.†—A capital journal for the popularization of natural history among the French Canadians. It is edited with much spirit, and we trust that its success is already assured.

TERATOLOGY.—M. C. Dareste has given us in the "Annales des Sciences Naturelles" a résumé of his remarkable discoveries, from which we translate a few paragraphs as nearly word for word as possible:

"I at first sought to obtain monstrosities, as Geoffroy Saint-Hilaire had done, by submitting eggs placed vertically or partially varnished to artificial incubation." "Later I recognized the fact that these two causes which I had set in operation were not the only ones which acted upon the embryo, and that it was necessary also to take account of another cause to which I had not at first attended; that is to say, of the manner in which the eggs were heated in one of the artificial 'couvenses,' which have served for my experiments. I have therefore, provisionally, abandoned the use of varnish, and the vertical position, in order to employ only a single cause of modification, the use of which I could perfectly control." When the egg is covered with varnish or other glazing, which partially excludes the air, the embryo can develop, but finally perishes when the allantois is formed "when the needs of respiration imperiously demand greater quantity of air." "I arrive now at the results which depend upon the mode of warming the eggs in one of my artificial brooding hens (couvenses). In this apparatus the contact of the egg with the source of heat takes place by only one point. Now if in place of directly warming the culminating point of the egg, the point which the cicatrix always occupies at the end of the development, a point of the egg situated at a certain distance from the preceding one be heated, the development is disturbed, and an anomalism is always produced, which manifests itself in the form of the blastoderm at first, and then in that of the vascular area. In fact, under these unusual conditions, the development of the cicatrix takes place more rapidly in the region lying between the culminating point of the egg, and the point of contact with the source of heat, than in the opposite region. On this account (Il en résulte qui) the blastoderm at first, and then the vascular area assumes an elliptical form, and the embryo is produced in one of the foci of the ellipse; while in its normal state the embryo occupies the centre of a perfectly circular blastoderm and vascular area. This result is very distinct, so distinct that allowing for the primitive eccentricity ("l'orientation") of the embryo, and giving to the egg a certain position with respect to the source of heat, this excess of development of a part of the blastoderm may be directed where it is desirable, either to the left or the right of the embryo, either above its head or at its caudal extremity."

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* Published at Salem, Mass., by A. S. Packard, jr. Fifty cents a part. To be published in ten parts.

† Le Naturaliste Canadienne. Bulletin des Recherches, Observations et Decouvertes se rapportant a l'histoire naturelle du Canada. Tom. I, nos. 1-4, 1869. Quebec. 8vo, $2.00, gold, with illustrations.

"The embryos which appear in the blastoderms thus formed are very frequently monstrous. I cannot say in what proportion however, since I am often obliged to study them at an epoch anterior to the appearance of a monstrosity, and I cannot therefore predict what would have taken place if incubation had been continued. However this may be, I have thus been able to observe almost all the types of simple monstrosities at different epochs in the formation of the embryo, and consequently to bring together the materials of teratological embryogenesis.

"And, first, I have established a very general condition of the formation of the greater number of monstrosities, of those at least which profoundly modify the organization; it is that they appear early, and during that period of life when the embryo is reduced (reduit) to a homogeneous matter, when the general form of the body, and the special form of each organ is sketched out before the appearance of definite histological elements." "Celosoma, Exencephalus and Ectromelia, so different in appearance, but which are almost always associated, have for a common condition an arrest of the general development of the amnios, which does not complete itself always in front, leaving thus the umbilical opening more or less open, and which (the amnios) completing itself only slowly behind, remains for a greater or less time in contact with certain parts of the embryo, which it submits to constant pressure. From this there results a certain number of deviations and atrophies in the regions of the body submitted to pressure.

"Symelia, which has been hitherto considered inexplicable, results from an arrest in development of the caudal hood of the amnios which forces the posterior members, at the moment of their appearance, to reverse themselves backwards, to come in contact with each other by their external edges, and to unite themselves in this universal position. Anencephalism has in the beginning hydropsy of the vesicles which are the first state of the encephalic organs. This hydropsy is found equally in the amnios, and sometimes, indeed, in the whole thickness of the tissues, which then present a general œdema, the result of a peculiar state of the blood which is completely colorless, and contains only very few globules. The want of globules in the blood has its rise in an arrest of development of the vascular area, which is only very imperfectly furnished with canals, and which presents the blood globules imprisoned in the isles of Wolf (iles de Wolf).

"The inversion of the viscera results from the unequal development of the two cardiac blastemæ, which, as I have discovered, precede the formation of the heart. In its normal state the right cardiac blastema is more developed than the left, and determines ulteriorly the incurvation of the cardiac arch more to the right of the embryo than the returning of the embryo (heart) upon the left side. During inversion, the left cardiac blastema develops itself more than the right, from which results the incurvation of the cardiac arch to the left of the embryo, and the return of the same upon the right side. The existence of two hearts, an anomaly unknown to Geoffroy Saint Hilaire, which M. Panum described some years since, and which I have had occasion to observe several times, results from an arrest of development which prevents the junction of the two primitive cardiac blastemæ. Cyclopia results from an arrest of development which prevents the two ocular blastemæ, primitively in contact, from separating themselves. This arrest of development is very probably in consequence of an arrest of development of the cephalic cap of the amnios; but I have not yet been able to establish this last fact with certainty." In fact I have seen that the inversion of the viscera may be obtained when, in one of the malformations of the blastoderm previously indicated, the left region of the vascular area is more developed than the right, and when, also, the temperature of the centre where incubation is effected, is relatively low. I have otherwise accumulated numerous indications which will soon permit me, according to all appearances, to produce at will other anomalies.

"I have made, also, many experiments in order to study the manner in which evolution is carried on at temperatures above and below the normal temperature of incubation. The high temperatures accelerate its progress, and produce that diminution of stature which constitutes Nanismus. The low temperatures, on the contrary, considerably retard the progress of development, and do not permit the embryo to exist (depasser) beyond a certain period.

"It is also a remarkable consequence of my studies that they explain the absence of certain monstrosities in certain species by the differences which these species present in their evolution. Thus the absence of the amnios appears to preserve the fishes from a great number of deformities; the absence of the amnios and that of the umbilical vesicle equally appear to give to the Batrachians a still more remarkable immunity."